Do Malaria Control Interventions Reach the Poor?:
A View Through the Equity Lens

DISEASE CONTROL PRIORITIES PROJECT

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DISEASE CONTROL PRIORITIES PROJECT

BACKGROUND

In the late 1980s, the World Bank initiated work to inform priorities for control of specific diseases and to generate comparative cost-effectiveness estimates for interventions addressing the full range of conditions important in developing countries. The purpose of the comparative cost-effectiveness work was to provide one input into decision-making within the health sectors of highly resource-constrained countries. This process resulted in the 1993 publication of *Disease Control Priorities in Developing Countries**. A decade after publication of the first edition, the World Bank, the World Health Organization, and the Fogarty International Center (FIC) of the U.S. National Institutes of Health (NIH) have initiated a "Disease Control Priorities Project" (DCPP) that will, among other outcomes, result in a second edition of *Disease Control Priorities* in Developing Countries (DCP*2*). The DCPP is financed in part by a grant from the Bill & Melinda Gates Foundation. DCP*2* is intended both to update DCP*1* and to go beyond it in a number of important ways, e.g. in documentation of success stories, in discussion of institutional and implementation issues, and in explicit discussion of research and development priorities. Publication of DCP*2* is intended for mid-2005.

*This volume was edited by Dean T. Jamison, W. Henry Mosley, Anthony R. Measham and Jose Luis Bobadilla and published by Oxford University Press in 1993.

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The Disease Control Priorities Project (DCPP) is a joint project of the World Bank, the World Health Organization, and the Fogarty International Center of the National Institutes of Health (U.S. Department of Health and Human Services). It is funded in part by a grant from the Bill & Melinda Gates Foundation. Conclusions conveyed in the Working Papers do not necessarily reflect those of any of the institutions listed.

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Abstract

The growing field of study in benefit-incidence analysis has demonstrated that many public health interventions that were developed to aid the poor are not reaching their intended target. For example, the poorest 20% of selected developing countries were as much as 2.5 times less likely to receive basic public health services as the least-poor 20%. This is particularly relevant for malaria control because 58% of malaria cases occur in the poorest 20% of the world's population, a greater percentage than any other disease of major public health importance in developing countries. Although early studies do not demonstrate a clear difference in fever incidence based on wealth status, significant disparities have been demonstrated in both the consequences of malaria and in the utilization of malaria prevention and treatment services. These early studies indicate the pressing need for a focus on the poorest in the design, implementation, and monitoring of malaria control programs

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Malaria: A Disease of Poverty

Anyone who works on malaria control knows that it is a disease confined almost exclusively to poor, developing countries. Almost all of the global burden of malaria is borne by countries in sub-Saharan Africa and South and Southeast Asia, the poorest regions of the world.

Even within these poor countries, malaria disproportionately affects the poorest of the poor. Gwatkin and Guillet have demonstrated that 58% of malaria cases occurred in the poorest 20% of the world's population, a higher percentage than any other disease of major public health importance (Table 1).[1]

Reaching the poorest of the poor with malaria control interventions poses great challenges, not solely because of financial barriers to accessing care and prevention services. The poorest populations in developing countries often live in the most remote areas and are socially or culturally marginalized.

In the global development community, concerns that public health interventions may not be reaching the poor and marginalized have led investigators to examine the differences in the burden of disease, and the coverage and impact of public health interventions among persons with differing wealth status. One of the primary tools in this line of investigation has been benefit-incidence analysis, in which disease incidence or risk factors are measured among segments of the population at various levels of wealth or income.[2]

The results of early studies have begun to demonstrate striking disparities in the utilization of public health services by the poorest, when compared to less poor populations. Although these services are often intended to reach the poor, very poor persons are least likely to receive the benefits of those services. For example, analyses of Demographic and Health Survey (DHS) data have documented that the wealthiest 20% of the population of 44 developing

countries were from 1.25 to more than 2.5 times more likely than the poorest 20% to receive key public health services, including treatment for diarrhea, childhood immunization, and antenatal care (Figure 1).[3]

Because the burden of malaria falls most heavily on the poorest segments of the population, such disparities in the use of public health services by the poor must be of particular concern to the malaria control community. If extra efforts are not made to reach the poorest of the poor with effective malaria control interventions, it is very likely that the Roll Back Malaria (RBM) target of reducing global malaria burden by 50% by the year 2010 will not be reached. Interventions, therefore, must be designed to ensure that a large percentage of the most poor are using effective treatment, insecticide-treated bednets, and other essential malaria control interventions. This can only be accomplished with a broader understanding of what types of approaches are best at reaching the poor and what barriers limit access and use of essential malaria control services.

Definitions and Measurements

A working definition for equity is an inequality that is both unfair and remediable.[4] Although much of the work, to date, on inequities has focused on socioeconomic status (SES), other factors that might lead to inequities must be examined, including sex, ethnicity and social class. Although there are quantitative measures for SES and sex, measurement of factors like social status are not easily. Qualitative research must supplement quantitative studies both to examine such factors and to identify underlying reasons why people use or do not use particular services.

One area of controversy has been in the measurement of SES. Because much of the commerce in developing countries is not cash-based and occurs outside the formal economy, measurement of income or consumption is difficult and an unreliable measure of wealth. Researchers have used so-called "asset indices" to measure household wealth. Such indices are constructed by assessing households for ownership of specific items (e.g., radios, bicycles, and cattle), the type of construction (e.g., earthen vs. brick walls, thatched vs. metal roofs), location (urban vs. rural), and other factors. A score is developed based on the presence or absence of such items. Analyses of differential burden or impact of interventions by wealth status often divide households into quartiles or quintiles based on their asset index.

One major limitation of such indices is that the types of variables and weights given to them vary from country to country, limiting cross-country comparisons. Despite these methodological limitations, the findings of such analyses often yield findings that are consistent from country to country.

Existing studies on the differential burden of malaria and the impact of control interventions by SES and other factors suffer from other limitations. Most studies are analyses of pre-existing data sets which were often collected for other purposes. Few studies have been specifically designed to answer questions about malaria burden and the impact of interventions by wealth status. In addition, a variety of methodologies for both data collection and analysis have been used, making comparisons of different studies difficult. Notwithstanding these limitations, the findings of these studies have yielded some surprising and important results.

Research Findings

A small number of studies have attempted to describe a relationship between malaria and poverty at the macroeconomic and geographical levels.[5] The scientific basis of these findings, though, is as yet rather limited.

Of the studies that have examined this issue at the microeconomic level, there have been conflicting findings as to whether or not malaria incidence differs between the poor and less-poor. A large sample, multi-country study that analyzed DHS data found little difference in the incidence of fever (as a proxy for malaria) across SES quintiles.[6] This finding might be explained, though, by the combining of data sets from several countries with different SES characteristics, the lack of specificity of reported fever as a proxy for malaria, and the controlling of several factors that are highly correlated with SES (e.g., housing type and urban vs. rural residence). This lack of correlation is supported, though, by evidence from a demographic surveillance site in Tanzania, in which the incidence of fever did not differ significantly across SES quintiles.[7]

In contrast, a few country-specific examinations have identified that the poor may be at greater risk of being infected with malaria. A survey in Zambia, for instance, found a substantially higher prevalence of malaria infection among the population in the lowest wealth quintile.[8] A recent review of existing published and unpublished studies related to issues of equity and malaria was not able to draw any conclusions regarding the link between malaria burden and SES.[9]

Whether or not the risk of infection varies by SES, current evidence suggests a much stronger correlation between wealth status and the consequences of malaria infection. In rural Tanzania, for instance, under-five mortality following acute fever was 39% higher among the poorest compared to the least poor.[10] The precise reasons for the higher risk of complications from malaria infection in the poor have yet to be elucidated. Many have pointed to the possibility that financial barriers limit access to both preventive or curative services and commodities. Non-financial barriers, including the educational status of the caretaker, distance from health services, and opportunity costs of lost time at work, must also be considered as possible underlying factors.

A number of studies have examined the equity dimensions of the use of preventive measures, particularly insecticide-treated bed nets. Data from an insecticide-treated bed net (ITN) social marketing project in Tanzania, for example, demonstrated that the least-poor quartile of the population were 2.74 times more likely to own a bed net than the poorest quartile (Figure 2).[11]

Similar disparities have been found in studies examining access to and use of treatment. Schellenberg and colleagues identified that children less than five years were twice as likely to receive appropriate treatment for fever if their family were in the least poor quintile than in the poorest quintile (62% vs. 31%, p 0.0001).[5] Filmer examined data from DHS surveys in seven Eastern and Southern African countries and seven Western and Central African countries to determine differences in treatment seeking for reported fever.[4] Significant disparities between the poorest and least poor quintiles were noted in the percentage not receiving any type of formal sector treatment in both East and Southern Africa (41% vs. 21%) and West and Central Africa (64% vs. 23%).

One factor which no doubt contributes to such disparities are the costs of commodities, such as bed nets and drugs. A study from Malawi found that expenditure on malaria prevention was positively correlated with income, indicating that the poorest households probably cannot afford such commodities as ITNs.[12] Further evidence in Tanzania from an ITN social marketing supports this argument, finding that the price of the net was the most common constraint on net ownership. This would suggest an important role for targeted subsidies to lower financial barriers to access.[13]

Beyond the costs of commodities, the reasons why the poor have more negative health outcomes and less often utilize prevention and treatment are likely complex. Cultural, behavioral, and educational factors that lead to delayed

treatment seeking may play important roles, but have yet to be examined by appropriate qualitative research. Lower levels of education may, for instance, be useful predictors of the type and timeliness of care-seeking behavior.[14] Elucidation of these factors could lead to "intervention-points" to lower barriers to effective use of prevention and treatment services.

Discussion

Clearly in this new line of investigation, there is much that we do not know. For example, studies examining the relationship between malaria burden and SES have yielded contradictory results. Filmer found no positive correlation between reported fever and SES in his analysis of DHS data.[2] Other studies have contradicted these findings.

In contrast, some noticeable trends can be detected in early studies looking at severe complications of malaria and the coverage of specific interventions, including ITNs and treatment. These findings could inform the implementation of malaria control programs. There appears to be a much stronger basis to conclude that the severe consequences of malaria are borne most heavily by the poorest. More limited access to both preventive measures and curative treatment may partially explain worse outcomes among the poorest. It remains to be clarified whether the barriers to preventive and treatment services are primarily financial or whether other factors (e.g., cultural practices and norms, gender roles, caretakers' educational status, proximity to health services) play a significant role. Disentangling the myriad factors that might limit the accessibility and use of malaria control services by the poor will require additional quantitative and more importantly qualitative research.

Not surprisingly, studies looking at both use of ITNs and access and use of malaria treatment also demonstrate lower coverage in the poorest compared to the least poor. Financial barriers likely contribute to these differences, and lowering the price of ITNs and treatment-- either through reducing production costs, elimination of taxes and tariffs, or providing subsidies to consumers—will almost certainly result in increases in coverage. One must not ignore other factors, including geographic and social isolation, that may also contribute to these disparities and must be addressed if high levels of coverage are to be achieved.

Reaching the poor with malaria control interventions

Within the Roll Back Malaria partnership, all agree of the pressing need to increase coverage of ITNs and drug treatment in the poorest. There has been debate, though, about the methods by which to achieve such increases in coverage. Different approaches have been tried for increasing the coverage of ITNs, including public sector distribution, social marketing by NGOs, and public-private partnerships with sale through commercial outlets. Often these approaches include the use of global or targeted subsidies, either through sale of subsidized products or the use of voucher. To date, there has been no definitive evidence indicating that any of these approaches is more or less effective in reaching the most poor.

Similarly, various approaches are being promoted to increase the use of highly effective drug treatment for symptomatic malaria, either through public sector facilities, community outreach, or the private sector. Evidence on the use of key public health services suggests that providing treatment only through public health facilities may fail to reach the poor. Little else is known, though, about alternative approaches. Will the poor be more effectively reached by providing treatment through community-level volunteers or by training private sector providers and drug sellers to provide the appropriate drug and dose to persons with malaria? Determining how coverage in the poor can most efficiently and effectively be increased must be a high priority if the goals of Roll Back Malaria are to be achieved.

Unfortunately, existing information on disparities in burden of malaria and coverage of key malaria control interventions raises more questions than it yields answers to these questions. Even in those areas where we can draw some conclusions, such as the increased risk of complications among the poorest, we can only hypothesize about the reasons why such disparities exist.

With this in mind, a brainstorming meeting was held in September 2002, sponsored by the London School of Hygiene and Tropical Medicine and the World Bank on behalf of the RBM Partnership. Experts in malaria control, monitoring and evaluation, economics, and program financing and implementation were brought together to review current information on equity and malaria, make recommendations on strategies for going to scale with malaria control interventions, and identify areas for further investigation.

This panel recommended that the RBM partnership should include considerations of equity within its goals and objectives for malaria control. Monitoring and evaluation to assess progress towards the goals of RBM at both the global and country level should incorporate measurements of SES, sex, and possibly other factors (e.g., educational status of caretakers) into their data collection and analysis schemes.

The group also noted that there was a growing body of information on the effectiveness of various strategies to reach the poor within other health and non-health related interventions. Such interventions in malaria control should be informed by these experiences.

The group expressed the need for additional research that was designed with issues of equity in mind. It noted that malaria-affected countries were using a diversity of approaches for going to scale with malaria control interventions. This would provide ample opportunities to examine which of these approaches most effectively reached the poor.

There was also acknowledgement that, while such original research was being carried out, further analysis of existing data sets could begin to provide some clues to what types of interventions are likely to reach the most poor. In particular, data from DHS, UNICEF's Multiple Indicator Cluster Surveys (MICS), and ongoing demographic surveillance sites (e.g., INDEPTH network) provide opportunities to begin to develop a better understanding of existing inequities and possibly provide insights in how the poorest can be reached.

Furthermore, examination of equity should not only be limited to SES, but rather look comprehensively at various other factors that might have an equal or greater impact on morbidity and the use of prevention and treatment services. These should include sex, age, marital and educational status, occupation, and other cultural and behavioral factors.

Among the priority areas for further study should be the effectiveness of vouchers or other methods for providing subsidies for essential commodities (e.g., ITNs and drugs) to improve access to the poorest. The need to assess factors that influence demand and supply for malaria control measures was also highlighted.

Lastly, there is a need for better measures of SES and for those other cultural factors that might lead to inequities. Despite the imperfect nature of current

measures of SES, though, much has been learned that will help guide program implementation and future research.

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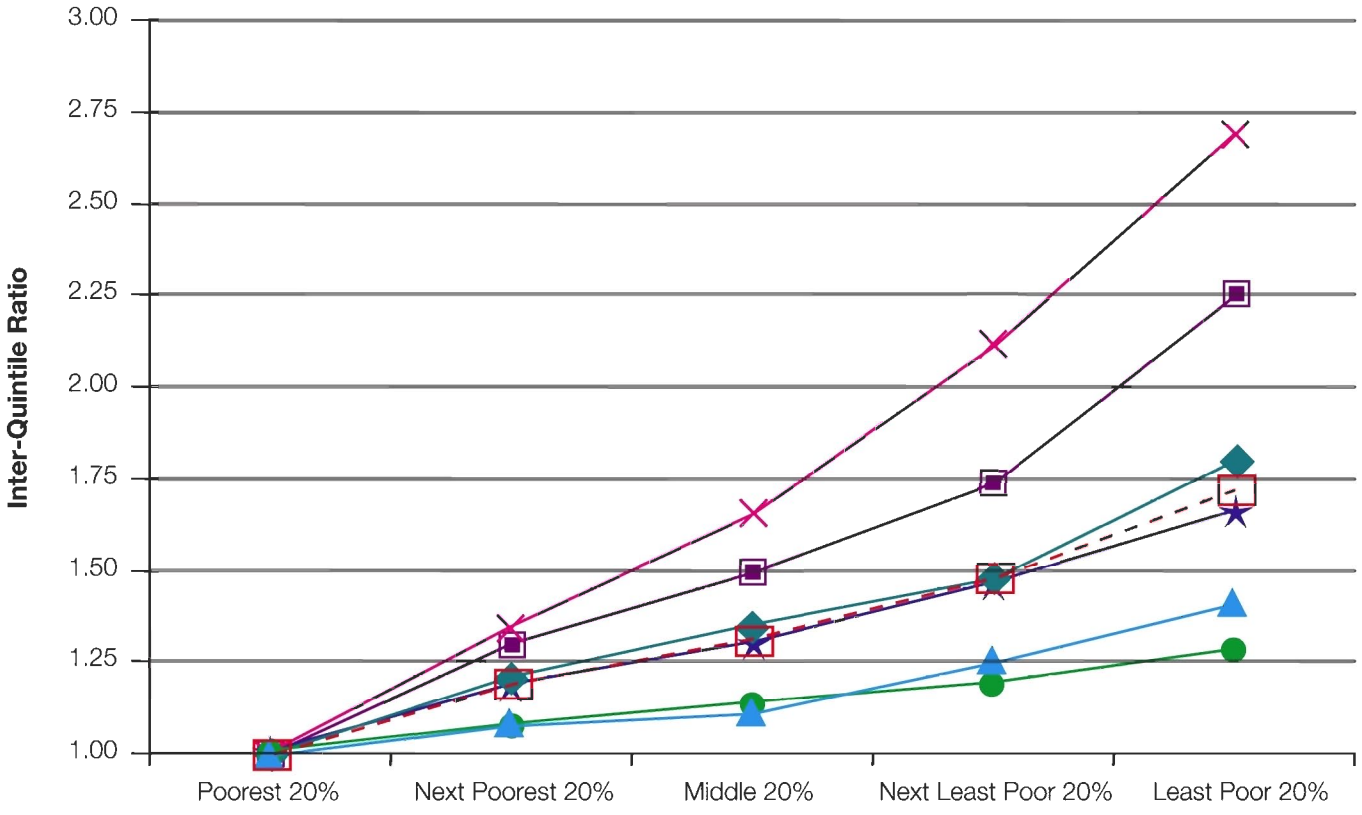
Table 1.
Percentage of mortality that occurs in the poorest 20% of the world's population

Disease	**% in lowest quintile**
Malaria	58
Diarrheal Diseases	53
Perinatal Conditions	45
Tuberculosis	44
Maternal Conditions	43
Respiratory Infections	43
HIV/AIDS	42

* Adapted from Gwatkin and Guillot, "The Burden of Disease Among the Global Poor", Global Forum for Health Research

Figure 1

Poor-less poor differences in the use of basic health care services in 44 developing countries



Mod. Contraception - Women (Avg. 25.2%)

Antenatal Care (Avg. 70.8%)

Att . Deliveries (Avg. 52.5%)

Diarrhea - ORT Treat. (Avg. 61.1%)

Diarrhea - Med. Treat. (Avg. 34.5%)

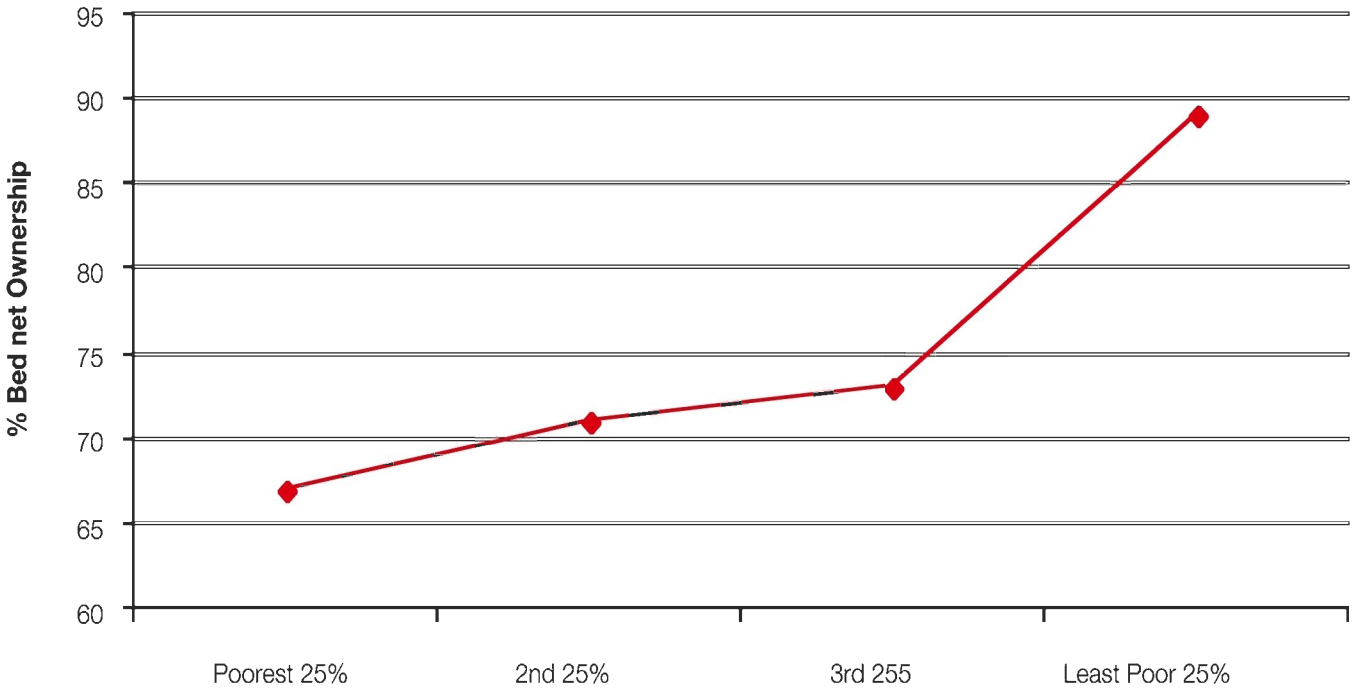
ARI - Med. Treat. (Avg. 46.1%)

Immunization - Full (Avg. 50.6%)

Courtesy of D. Gwatkin

Figure 2

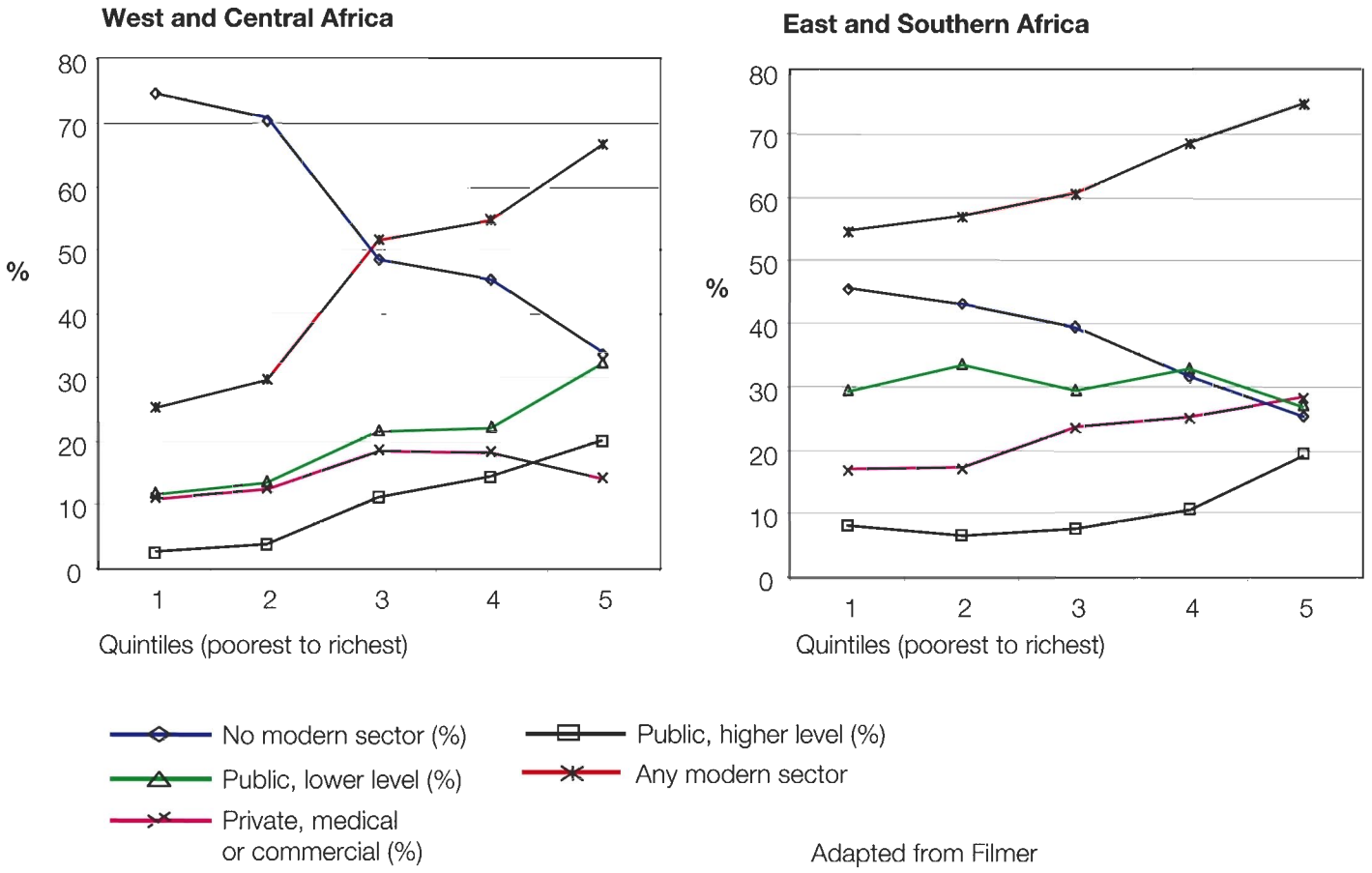
Household ownership of bed nets by socioeconomic quartile in southern Tanzania



Adapted from Abdulla, et al. BMJ, 322: 270-3.

Figure 3

Source of treatment for fever by socioeconomic quintile in 7 West and Central and 7 East and Southern African countries



Adapted from Filmer

References

1 Gwatkin DR and Guillot M. (2000) The burden of disease among the global poor: Current situation, future trends, and implications for strategy. Global Forum for Health Research Publications.

2 Castro-Leal F, Dayton J, Demery L, Mehra K. (1999) Public social spending in Africa: Do the poor benef t? World Bank Research Observer, 14: 49-72.

3 Gwatkin DR. Overcoming the Inverse Care Law. Leverhulme Memorial Lecture, Liverpool School of Tropical Medicine, September 17, 2002.

4 .Whitehead M.

5 Sachs J. and Malaney P. (2002). The economic and social burden of malaria. Nature. 415: 680-5.

6 Filmer D. (2002). Fever and its treatment in the more and less poor in sub-Saharan Africa. World Bank Policy Research Working Paper #WPS2789.

7 Schellenburg JA, Victoria CG, Mushi D, de Savigny D, Schellenberg D, Mshinda H, Bryce J. (2003). Inequities among the very poor: Health care for children in rural southern Tanzania. Lancet, 361: 561-566.

8 Report on the Zambia Roll Back Malaria baseline study undertaken in 10 sentinel districts, July to August. (2001). RBM National Secretariat.

9 Worrall, Basu, Hanson (2003). The relationship between socio-economic status and malaria: a review of the literature. In preparation.

10 Mwageni E. (2002) Household wealth ranking and risks of malaria mortality in rural Tanzania, In: Third MIM Pan-African Conference on Malaria, Arusha, Tanzania.

11 Abdulla S, Schellenberg JA, Nathan R, Mukasa O, Marchant T, Smith T, Tanner M, Lengeler C. (2001) Impact on malaria morbidity of a programme supplying insecticide treated nets in children aged under 2 years in Tanzania: Community cross sectional study. BMJ, 7281: 270-273.

12 Ettling (1994) Economic impact of malaria in Malawian households. Tropical Medicine and Parasitology, 45: 74-79.

13 Hanson K and Worrall E (2002) Social marketing of insecticide-treated nets-Phase 2 (SMITN2), Tanzania: End of project household survey analysis. Malaria Consortium: 43, London.

14 Fawole O.I. and Oneadeko M.O. (2001). Knowledge and home management of malaria fever by mothers and care givers of under f ve children, West African Journal of Medicine, 20: 152-7.

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